ON THE

METEOROLOGY OF TRINIDAD,

A PAPER READ BEFORE THE

SCIENTIFIC ASSOCIATION

OF TRINIDAD.

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1864

BY

HERMAN CRÜGER, ESQUIRE,

Colonial Botanist.

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WITH AN OBITUARY NOTICE OF THE AUTHOR,

BY

ALEXANDER WILLIAMS ANDERSON, Esq.,

PRESIDENT OF THE ASSOCIATION.

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SCIENTIFIC ASSOCIATION

OF TRINIDAD.

The object of this Association is the Cultivation of Scientific Knowledge, more especially of those branches connected with the West Indies.

RULES.

1. That this Association be called the "Scientific Association of Trinidad."

2. The objects of the Association to be carried out by the reading of Papers and the discussion of scientific subjects, by maintaining a correspondence with scientific men in other countries, by assisting in the development and application of Science in the West Indies, and generally by the collection and publication of useful information.

3. The Association to consist of a President, a Secretary, and Treasurer, and Resident and Corresponding Members.

4. When any person shall be proposed for admission to the Association as a Member, he shall be elected by Ballot at the next Meeting thereafter, and a single black ball shall exclude.

5. The Association to meet monthly on such days as may be fixed; and at the monthly meeting in October of each year, the President and other Officers of the Association are to be elected.

6. No motion relative to the Rules of the Association shall be brought forward, except at a Special General Meeting of the Association; and no such motion shall be carried except by a majority of two-thirds of the Members present at such Special General Meeting.

7. Two-thirds at least of the Members of the Association shall be required to constitute a Special General Meeting; and in order to constitute such Special General Meeting it shall be requisite to give notice thereof at an Ordinary Meeting.

8. The Subscription of each Member shall be Three Dollars per annum, payable half-yearly, on the 1st of July and the 1st of January of each year.

9. Members may introduce Strangers to Meetings of the Association. Provided that no person shall be considered a Stranger after he shall have been resident in the Island longer than three calendar months.

SCIENTIFIC ASSOCIATION OF TRINIDAD, 1864.

President.

ALEXANDER WILLIAMS ANDERSON.

Secretary and Treasurer.

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PREFACE.

The following Memoir was read to the Scientific Association on the 10th of February, 1864, and at the next following Meeting the melancholy duty of reading the accompanying Obituary Notice fell to the President.

The benefits which must flow from a knowledge of Meteorology to the Agricultural community are perhaps scarcely of less importance here than those which accrue to the seafaring interests in the maritime countries of Europe.

The Memoir by Mr. Crüger gives the results of his observations in a more generalized form than the Meteorological Diagrams and Registers which were kept by him in his capacity as the Colonial Botanist and Meteorological Observer of the Government. Copies of the latter have been periodically forwarded to the Meteorological Department of the Board of Trade; and Abstracts of the Registers have been regularly published in the *Royal Gazette* of the Colony.

The Memoir, with the accompanying Diagrams and the Obituary Notice, is now printed; the Corresponding Committee of the Society of Arts, under the presidency of his Excellency Governor Keate, having recommended that the expense should be defrayed out of the annual grant made by the Government to that body.

R. J. LECHMERE GUPPY.

Trinidad, August, 1864.

OBITUARY NOTICE

OF

MR. HERMAN CRÜGER,

READ TO THE SCIENTIFIC ASSOCIATION OF TRINIDAD,

BY

ALEXANDER WILLIAMS ANDERSON, PRESIDENT.

It is with deep regret that I have to announce to the Association the death of Mr. Herman Crüger, the Colonial Botanist of this Island, and a Member of this Association.

Mr. Crüger was from early life a cultivator of the Sciences. He was a good Chemist, and a good Astronomer, but the subject to which he chiefly devoted his time was Botany. His name may be seen quoted in the scientific publications of Europe as one of the recognised authorities in particular departments of the science of Botany.

In conjunction with his duties as Colonial Botanist, Mr. Crüger was entrusted by the Government with the superintendence of an Observatory erected in the Botanic Gardens, and supplied with the usual instruments for observing and recording meteorological phenomena. The paper which he read at our last meeting giving the general results he had arrived at after two years of meteorological observations, is written in a language foreign to the author. It is, however, believed that that paper will afford valuable information on a subject which has heretofore received but little attention in the Colony from a scientific point of view, but which is now exciting general interest, and more

particularly in those who are endeavouring to establish a system of general laws deduced from observations taken in all parts of the world.

Mr. Crüger was a patient and accurate observer; Science has lost in him a useful and devoted votary. His habits having been those of an individual imbued with a deep and constant passion for Science, to which he gave up all his time, energies and means, admit of little being said in a biographical point of view. In his private character he was esteemed by all who knew him: and it will be a source of satisfaction to them that the paper I have referred to, written by their deceased friend, will be published as a record of his worth, and an evidence of the general loss sustained in his untimely death.

ON THE

METEOROLOGY OF TRINIDAD.

By HERMAN CRÜGER, Esq.

Having conducted for two years a series of careful Meteorological Observations, I think I may upon this occasion redeem my promise to give the results of them in a systematic form, together with such remarks as could not fail to strike me while at work. Before entering into details, however, you will allow me to prefix a few considerations bearing on the one side on the esteem more or less merited in which Meteorology is held, and on the other hand on some general features of the subject, which those who wish to have a clear insight into it should not lose sight of.

For the Members of this Association, which calls itself Scientific, the consideration of the practical bearings of a Science must naturally be secondary, although we ought not to lose sight of them altogether. Therefore, we shall first examine of what use Meteorology has been hitherto, and what it promises to do for mankind in future, postponing the more scientific part for *la bonne bouche*.

An illustrious author has defined the principal aim of Meteorology "to predict weather." I think that this is only to be understood so that on board ships, and for shipping interests, and many others, *i.e.* Agriculture, the knowledge of the probable phenomena in meteorology for a more or less short period beforehand, is of the highest importance. But the knowledge of the phenomena in itself, connected with the cosmic facts by which they are influenced, and the satisfaction that knowledge produces,

has evidently nothing to do with the prediction of what will or must happen within a given time. I believe it is Bacon who says somewhere that the test of a good theory is that it should be able to predict phenomena, but you must bear in mind that he uses the words *test* and *theory*, without in the least meaning that the principal aim of a Science should be such. A Science may be advanced to a considerable degree in accumulated facts, and partial connection of them, without being presided over by a complete theory which will bear the above test, and this is precisely the case with particular branches of Meteorology.

However, keeping in mind the restricted sense in which the above is to be understood, and acknowledging its importance, let us turn to another important branch of application, particularly when it is combined with geographical Meteorology. This is the knowledge of the phenomena of heat and moisture, under whose influence the cultivation of the useful plants is carried on. It would carry us too far were I to develop the influences as they have been discovered; but the researches of Quetelet and of DeCaudolle, the younger, and a few others, are extremely important and interesting, particularly the part relating to useful temperatures (*températures utiles*). I regret that with regard to tropical countries there is a considerable blank in our knowledge in this respect. There is no positive explanation of the fact that some plants of higher latitudes do not thrive here. It is true that the phenomenon is of a very complicated nature, affecting principally vegetable physiology, perhaps the most difficult of natural Sciences.

Another application Meteorology finds in medical Science, and Meteorological Nosology is no more a *pium desideratum*.

Meteorology, although having to do with agents only of a physical nature (using the word physical here in its restricted sense), which ought to give it an exact character, is till now far from being an exact Science, such as Astronomy, Mechanics, Dynamics, or even Chemistry. Yet in its more universal features it is already subjugated under formulas, showing the course of phenomena, and their principal causes.

The principal causes of Meteorological changes are the heating power of the sun and the double motion of the earth. The earth moves round the sun in a great circle, the Ecliptic; and it is thus we see the sun here sometimes to the north, sometimes to the south; beyond the tropics always to the north or south, according to the hemisphere, but in different seasons at a different altitude. The heat unanating from the sun raises the temperature of the layers of air next the earth, and necessarily most so near the equator, and causes these layers of air to ascend. But as the rays of the sun strike a given place at different periods of the year at different angles, the line of maximum upward current of air is shifting from one side of the equator to the other, and at the same time the temperature of the locality is higher or lower. This gives us the principal period of phenomena, the yearly one.

The upward stream of heated air, which if the earth did not turn upon its own axis, would give rise to lateral streams or winds from the north and south, causes as the earth turns to the east the movement of the winds or currents of air which fill the void which would be left by the ascending stream to be deflected by the great velocity which it has near the equator, to the north-east or south-east, according to the sides of the equator to which they approach, according to circumstances more or less, leaving a belt of apparent calms produced by the upward current. This upward current descends again towards the earth in about the latitude of Teneriffe, where it has been felt by direct observation, and where it produces another apparent calm. Between the calms of the Equator and those of Cancer and Capricorn, lie the two belts of trade winds.

Beyond the tropics the currents of air are more complex, so as to hide the primary causes more, although the laws are the same.

The motion of our globe around its own axis, which, as we have seen just now, produces the deflection of the lateral currents of air, produces a periodicity of meteorological phenomena next in importance, the daily one. In higher

latitudes it is only the thermometer that is very visibly affected by the daily course of the sun in the heavens, but between the tropics the barometer shows a diurnal variation. We shall see further on what is the relative importance of these phenomena.

You will pardon me for having gone through these elementary principles with you; I thought it not altogether unnecessary to refresh our memory a little with regard to the primary causes of meteorological phenomena. To these even magnetic currents appear to be obedient.

Let us turn now to the influence the above phenomena must have on our instruments, and in these latitudes. You know that the Barometer is a tube filled with quicksilver, closed above, the open lower end communicating with a cup of the same metal exposed to the pressure of the air, which, as it diminishes or augments, causes the metal in the tube to fall or to rise. It is a sort of balance in which the atmosphere above the quicksilver in the cup is at every moment weighed. If therefore the atmosphere gets denser in a given place, the barometer rises, while it falls when the air becomes dilated. But these phenomena occur under the influence of heat and cold, directly by the sun or by the transfer of lateral streams of warmer or colder air. For this reason the barometer rises with northerly and falls with southerly winds. For this reason it ought to fall with the rising sun and rise with the setting sun. You see from this that the barometer is nothing but a thermometer also, with this difference, that the barometer feels heat and cold at great distances horizontally and vertically, while the thermometer is only influenced by local phenomena. But if the barometer weighs the atmosphere, it gives us only its gross weight, *i.e.*, with all its admixtures. Besides dry air, the atmosphere contains some other matters, none of which, however, are of any moment except the aqueous vapor. This aqueous vapor modifies considerably the phenomena observed by the barometer. While the above propositions of the rise and fall of the mercury with cold and heat are absolutely necessary and certain, the real effect is obscured by the interven-

tion of aqueous vapor. Fortunately we have the hygrometer, an instrument which, when properly constructed and handled, gives us pretty exactly the quantity of moisture contained in the atmosphere. By separating the two then, the dry air and the vapor, it has been found

1. That there is a period of annual maximum and minimum in the pressure of dry air.
2. That there is *one* period of maximum and minimum in the pressure of the dry air in the 24 hours.
3. That the real height of the barometer is modified by the vapor in the annual period to such an extent that the maximum becomes minimum, and *vice versâ* (perhaps doubtful).
4. That the influence of the vapor produces in the daily fluctuations two maxima and two minima, noticed under the tropics principally, and near the sea, while it disappears in the interior of large continents. This subject was first properly studied by Humboldt, and the phenomena have been traced to a greater distance from the equator.

From the considerations detailed before, it is evident further, that

1. The barometer falls with the rising thermometer.
2. That this phenomenon must increase inversely as the latitude.

I must add that these laws are all much more evident and of easy proof and study near the equator. This relates to the barometer, an instrument much more grateful and satisfactory in a scientific point of view, in these latitudes than in higher latitudes, whatever its interest may be in the latter in its applications.

The oscillations of the barometer, although very regular here, are small, and it is necessary therefore to have a first-rate instrument, and that it should be read carefully, if one wishes to

derive benefit from it. I am led to this remark by a popular opinion that barometers are useless here; in fact, that "they do not act," as I have heard it stated.

The thermometer, so interesting an instrument in higher latitudes, particularly in the hands of such men as Dove, is of perhaps inferior value here, as there is but a slight oscillation in the mean temperature in the course of the year. You will not expect me to expound to you the causes of the greater inequalities in higher latitudes as they form part of the most elementary education. But the magnitude of the oscillation is interesting to consider, and I shall give you below an account of them in this island.

Of the remaining elements of the meteorology of these latitudes, and of this island in particular, the consideration of the fall of rain and the relative humidity of the air are the next interesting, although the presence or absence of clouds and the strength and direction of the winds are on the one hand causes and on the other effects, not to be neglected in a general tableau of our meteorology.

In higher latitudes the phenomena indicated by the hydrometer are of a very irregular character, and the laws which regulate them not often directly to be traced. It is different again in our latitudes. The sun's rays rarifying the air create an upward current, as already stated, which is fed by lateral ones, passing over the moist surface of the earth and the sea, and loading themselves while they become warmer with moisture or aqueous vapor. In ascending, this hot air, saturated more or less, gets colder and loses its superfluous moisture, *i.e.*, that which it cannot hold at a lower temperature, in the form of rain. This is the reason why our heaviest rains always take place in the middle of the day. The night rains are due to lateral currents of hot and moist air meeting with cold currents not dry enough to hold the whole moisture the former contains while they mix. Thus heavy rains may be occasioned by the violent winds sometimes experienced, particularly in the West India Islands

further north. Generally the rains occasioned by the mixture of lateral currents of air are, however, more of the light kind.

While the sun heats the moist air, and makes it ascend, the aqueous vapor acquires an expansive force, which produces a rise in the barometer until about ten in the morning. When this action continues the superfluous air and vapor flow off in the higher regions, and the barometer falls till about 3 p.m., when it begins again to rise by the momentum of the denser descending vapor. This effect is again diminished after 9 p.m., until a second minimum is reached about 4 a.m.

We have already seen the influence of the winds in bringing about a precipitation when hot and cold winds mix. This is always, it would appear, the cause of rain in higher latitudes, or nearly always, at least.

We shall now see when we go through the meteorological characters of the months how the more or less covered sky influences our instruments, and how it must influence vegetation. In noting the appearances we see little difference in our island ; it is different in higher latitudes, where the clouds may be said to depict what is going on at a distance. Here we have scarcely anything else to note than the so-called *cumulus*, which is a cloud of rounded outlines with an ascending peak above, indicating the rising vapors, which will be precipitated when they have risen sufficiently high. Once this precipitation over, the sky is generally here and there spotted with *cirrhus*, or feather-clouds, indicating fine weather.

I have constructed tables and diagrams to show the principal phenomena observed. We shall take into consideration first the course of phenomena in the twenty-four hours. The well-known double period is strongly marked ; the maxima occurring at 10 a.m. and from 11 p.m. to 1 a.m. ; the minima at from 3 to 4 p.m. and 4 a.m. The whole range is about 0·100 inch. If we now separate the vapor pressure from that of dry air, there is found in the latter one strongly marked minimum about 2 p.m. coinciding with the hottest time of the day, the other time from

10 p.m. to 10 a.m. oscillating around the maximum. As has been observed also elsewhere, the tension of vapor of course follows a reverse course.

I shall show that the phenomena of the year are much the same; that is, that the curves are considerably modified when the two pressures are separated. The result is not exactly in accordance with the theoretical principles explained above, nor with the experience of other localities. The phenomena in the days, months, and years, are so much alike, that any considerable error in the observations cannot be supposed; they are also of the simplest nature, as you are aware. The principal fault lies very likely in the instrument used to determine the tension of vapor; a dry and wet bulb thermometer, which, whatever precautions one may take, will be influenced considerably by the amount of motion in the air, particularly when the latter is very moist.

The course of the thermometer is strongly marked in the diagram of hourly observations, showing a maximum at 2 p.m., and a minimum about sun-rise.

From the two curves, "Humidity," and "Force of Wind," you will perceive, what is verified by the hourly observations, that the one influences the other considerably. When the latter is going up, the former will be constantly affected in the inverse manner. My belief is, that the result may be altered by a current of air in this climate to more than one-eighth. The general feature of humidity is and must necessarily be, that it decreases as the temperature increases, and we have seen already that the dry pressure is lowest when the temperature is highest.

If we turn to the annual phenomena, such as they are represented in the annexed table and diagram, we find, to begin again with the barometer, that we have two pretty strongly marked maxima and minima; these nearly coincide for the two years, which circumstance gives them an appearance of truth. The maxima occur in January and February, and in May to August, the minima in April and November. The range of the barometer

is pretty equal throughout the year, except in October and November, when it attains a maximum. The mean oscillation for the two years elapsed has been ·089; according to Professor Forbes' formula it ought to have been ·093, giving only a difference of ·004 inch, which I believe is a satisfactory result. The mean range has its maximum from October to March, its minimum the remainder of the year, the lowest point being in July, when it is only between ·060 and ·070 inch. If we try now to separate again dry air from vapor pressure, we find, as you will see from the diagram representing the phenomena, that there is a decided maximum in the beginning of the year with a corresponding minimum in October and November. There is, besides, a tendency to a sub-minimum in April and May, apparently corresponding to the first minimum of the total pressure; but the second maximum is entirely effaced. Keeping in mind what I have stated above, respecting our apparatus for measuring the humidity of the air, I think that in general we find here again the fact elicited that the barometer rises when the temperature falls. For to turn at once to the thermometer, it is lowest, as you will perceive, in the beginning of the year.

Reverting for a moment again to the total pressure of air and vapor, we cannot help being struck by the fact that the maxima correspond to the solstices and the minima to the equinoxes, at least approximately. We cannot build any great speculations on only two years of observations, but the phenomena are too apparent to allow a doubt to remain of their regularity, and I think we must class it with the phenomena arising from the shifting of the belt of lateral and upward currents of air alluded to before, and arising from the motion of the globe. How the conformation of continents and ranges of mountains may influence these meteorological phenomena, is a more complex question, and longer periods of observation may shift the times of our maxima and minima a little, while they will fix them more.

As we are within the tropics, and only ten degrees from the equator, the solstices must give us through the barometer, which

acts at great distances, or is acted upon, as I should say, notice of polar currents of heavier air, causing the barometer to rise, while it must be lower at or near the equinoxes. To show how much the barometer is acted upon while other meteorologic phenomena apparently remain unaltered, I shall mention that the barometer was disturbed by a fall and rise of more than twice its annual range by a "Norther," which sunk one of the steamers of the Royal Mail Company at Colon. We had here, during the time, the common weather of every day. If we take the separation of the vapor pressure as above exposed, as correct, it is true the double period disappears, or nearly so; but I have already given my reasons for distrusting the results obtained from our instruments, to which I will here add, that they act only at very short distances, so that what we separate from the total pressure, under the name of tension, is a local phenomenon, must be still an incorrect amount, being either above or below the true value, according to circumstances. But, nevertheless, we have indications of a double period in both years.

If you look at the diagrams and numbers relating to temperature, you will find that they contain not much new information. December and January are the coolest months of the year; from January the mean temperature rises quickly to its maximum amount in May, after which month it gradually goes down. The range of temperature, as low as only 11° during the rainy season, sometimes is highest in April and May, that is, in the height of the dry season. You will perceive that the mean temperature of 1863 was lower than that of 1862, while the range was higher. At the same time, to confirm the fact alluded to before, the barometer was higher in 1863 than in 1862.

The similarity of the two years is great as respects the quantity of aqueous precipitation. The year 1862 gave 64·786, while 1863 gave 67·835 in., the difference being only about 3 inches. The amounts of each month occasionally differ a good deal. The number of days on which rain fell agrees also closely in the two years, being for 1862—197, and for 1863—201. As I have

already stated, rain generally falls in the wet season owing to the ascending current of air, and the most of it with a falling barometer, but in the months of January or February to April, lighter showers occur with an ascending barometer.

The relative humidity of the air is also of a very uniform character in the two years. The periods of maxima and minima appear to shift a little, so that we have the former in 1862 in August and November, in 1863 in July and November. The minima in 1862 occurred in April and October, in 1863 in May and October; this places the Indian or St. Michael's summer, in both years in October.

I have attempted to give an idea of the winds by the following plan, which, however, I do not wish to recommend until it is confirmed by observations of a more complete character, and conducted under better conditions than those at present existing in the Observatory at St. Ann. I took the direction of the winds, and gave them the following signs :—E.=0, N.E.=+ 1, N.=+ 2, S.E.=—1, S.=—2. As we have no other winds to register here, W. and S.W., or N.W. only blowing sometimes at unusual hours for observation. You will see that besides there being a very decided southern wind in the wet season, northern signs are found in December, January, and February. Generally speaking, the observations of the wind in Trinidad are unimportant, and especially so at St. Ann.

There remains one column to be recorded, that of Clouds. It exhibits no striking phenomena, except a small excess in the rainy season. This is principally owing to the hours at which the observations are taken. There is a certain amount of cloud, even in the driest part of the year, in the morning and afternoon. If a complete record could be obtained of all hours in the whole year the numbers would appear very different. The amount of cloud is of importance, as it lowers the temperature by its presence in the day-time, interrupting the direct rays of the sun, and as it lowers the temperature at night again by its absence by not preventing radiation towards the sky and the production of

dew consequent thereon. I need not dwell on its importance in agricultural respects, and with regard to vegetation generally.

I had an intention of investigating the influence—apparent or real—of the Moon, on our Meteorology; but I soon found that even if I had traced an apparent coincidence or two it would have proved nothing, on account of the shortness of the period of the available observations. I had invited our friend, Mr. Hamilton Warner, to investigate mathematically the theoretic degree of influence we ought to feel here as compared with the mean latitude of European places of observation. He has had no time yet to do so, but he promises to treat this matter on a future occasion.

RESULTS OF METEOROLOGICAL OBSERVATIONS TAKEN AT THE OBSERVATORY AT ST. ANN, NEAR PORT-OF-SPAIN, TRINIDAD.

Lat. 10° 40′ N., Long. 61° 34′ W. 130 feet above the Sea-level.

	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	1864	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863	1862	1863
Barometer	29·873	29·851	29·856	29·880	29·832	29·848	29·800	29·842	29·803	29·873	29·848	29·870	29·850	29.878	29·834	29·876	29·821	29·832	29·780	29·799	29·774	29·786	29·807	29·813
Do. Range	0·240	0·187	0·211	0·180	0·221	0·240	0·216	0·182	0·197	0·180	0·218	0·197	0·198	0·194	0·187	0·188	0·198	0·246	0·212	0·273	0·340	0·281	0·207	0·222
Ditto Mean Range	0·097	0·098	0·087	0·099	0·092	0·099	0·082	0.091	0·078	0·088	0·075	0·073	0.068	0·063	0·079	0·080	0·092	0·091	0·097	0·105	0·094	0·101	0·094	0·097
Vapor	0·722	0·733	0·728	0·718	0·713	0·731	0·713	0·726	0·792	0·746	0·820	0·769	0·836	0·806	0·873	0·822	0·879	0·833	0·856	0·843	0·839	0·834	0·784	0·779
Dry Air .. .	29·151	29·118	29·128	29·162	29·119	29·117	29·087	29·116	29·011	29·127	29·028	29·101	29·014	29·072	28·961	29·054	28·942	28·999	28·924	28·956	28·935	28·952	29·023	29·034
Thermometer ..	75·4	75·0	76·4	76·2	76·7	76·1	77·8	77·3	80·6	79·0	78·6	79·0	78·7	77·5	78·5	78·3	78·9	78·5	79·1	78·8	77·9	78·1	77·1	76·2
Ditto Range.. ..	14·2	15·2	17·0	14·8	16·0	15·7	17·2	17·7	16·5	17·5	14·0	16·3	12·8	14·2	11·7	13·4	12·9	16·0	13·2	15·2	15·2	13·8	16·4	11·7
Humidity	0·768	0·778	0·750	0·745	0·706	0·746	0·677	0·699	0·697	0·677	0·785	0·737	0·815	0·811	0·860	0·804	0·834	0·810	0·818	0·802	0·833	0·816	0·791	0·808
Rain—total	2·515	1·540	0·666	2·715	0·775	1·450	0·251	0·855	1·419	1·265	8·475	9·120	10·360	10·125	95·78	10·530	11·977	12·110	6·600	6·240	10·060	4·335	3·085	6·575
Do. Mean per day	0·081	0·050	0·023	0·097	0·025	0·047	0·008	0·024	0·047	0·041	0·282	0·304	0·334	0·327	0·309	0·340	0·399	0·404	0·213	0·201	0·335	0·145	0·100	0·212
Rainy Days	24	12	15	15	4	12	6	8	8	9	19	18	24	21	28	21	22	18	21	19	23	21	15	16
Cloud	291	257	252	262	288	290	274	258	263	269	298	341	344	392	366	338	318	313	322	312	339	317	236	309
Wind ±	+10	—4	+16	+6	—15	—11	—12	—27	—34	—28	—29	—16	—14	—26	—31	—10	—25	—25	—26	—39	—26	—25	—23	+2

Mean Barometer of the two years, 29·834.
Mean Range of Barometer for the two years ·089. Wet Days in 1862 = 197, in 1863 = 201.
Mean Thermometer 1862 = 77·9. 1863 = 77·5. Mean of both years 77·7.
Clouds, N.E. = +1. N. = +2. E. = 0. S.E. = —1. S. = —2. Rain—total 1862 = 65·761 inches. 1863 = 66·860 inches.

EXPLANATION OF THE DIAGRAMS.

The figures at the top of Diagrams Nos. 1, 2 and 3, refer to the months; thus 1 signifies January, 2 February, and so on. The figures at the top and bottom of Diagram No. 4 indicate the hours.

The dotted lines are those for the year 1863, and the continuous lines for 1862, except in the upper part of Diagram No. 1, where the curves for both years are continuous.

DIAGRAM No. 1.

The two upper lines in this Diagram are those of the barometer. The two series of lines in the middle of the Diagram show the curves of Range and Mean Range of the Barometer. The lower lines are those of Rainfall.

DIAGRAM No. 2.

The three series of lines in the upper part of this Diagram represent respectively the maximum, the mean and the minimum temperatures of each month in the years 1862 and 1863. The lower pair of lines expresses the Humidity.

DIAGRAM No. 3.

The upper pair of lines shows the pressure of dry air; the value of the lower pair, those of the tension of Vapor, having been subtracted from the gross corrected Barometric Pressure.

DIAGRAM No. 4.

Shows the hourly observations of the Barometer, Thermometer, Hydrometer and Anemometer, taken on the 21st December, 1863.

Note.—The Observatory at St. Ann is so placed at the opening of a valley as, while comparatively cool, the observations of the force and direction of the wind are not always applicable to the other parts of the island.